

REMARKS

Claims 1-16 are pending. By the Office Action, claims 1, 3, 5, 7, 9, 11, 13, and 15 are rejected under 35 U.S.C. §103(a); and claims 1, 2, 4, 6, 8, 10, 12, 14, and 16 are rejected under 35 U.S.C. §112. By this Amendment, claims 1 and 2 are amended for clarity only, without altering the scope of the claims.

Support for the amendments to claims 1 and 2 can be found, for example, in original claims 1 and 2. No new matter is added.

I. Rejections Under §112, Second Paragraph

A. Claims 1 and 2

Claims 1 and 2 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Office Action argues that the claims are indefinite because the claims include the variables m, n, and p as referring to the amount of oxygen and the number of R groups in the monomers. The Office Action questions whether the two sets of variables are the same. Applicants respectfully traverse this rejection.

In response, Applicants submit that the two sets of variables m, n, and p are the same. That is, the variables m, n, and p refer both to the amount of oxygen and the number of R groups in the monomers, as these two quantities are directly related to each other as noted in the chemical formulas. Because these relationships are clear from the claims and would be readily understood by one of ordinary skill in the art, the claims are not indefinite.

Accordingly, claims 1 and 2 are not indefinite. Reconsideration and withdrawal of the rejection are respectfully requested.

B. Claims 2, 4, 6, 8, 10, 12, 14, and 16

Claims 2, 4, 6, 8, 10, 12, 14, and 16 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Office Action argues that the claims are indefinite

because the first and third monomers in claim 2 are the same. Applicants respectfully traverse this rejection.

Although the first and third monomer units in claim 2 are the same, Applicants submit that this does not render the claim indefinite. Rather, the first and third monomer units in claim 2 are component monomers in the two different polymers (2) and (3). Thus the polymers (2) and (3) are different, although some of their constituent monomers may be the same.

That is, as presented, claim 2 recites an "anti-reflection film material ... which contains at least a polymer compound having repeating units for copolymerization represented by the following general formula (2) and a polymer compound having repeating units for copolymerization represented by the following general formula (3)." The claim then sets forth two polymer compounds, each comprising two different monomer units. Polymer compound (2) comprises two different monomer units denoted by the subscripts a_2 and b_2 , while polymer compound (3) comprises two different monomer units denoted by the subscripts a_3 and c_2 . Claim 2 further specifies, inter alia, that each of a_2 , b_2 , a_3 , and c_2 are greater than 0 but less than 1, meaning that both of the a_2 and b_2 monomer units must be present in polymer compound (2), and both of the a_3 and c_2 monomer units must be present in polymer compound (3).

Accordingly, although the a_2 and a_3 monomer units may appear to be the same in claim 2, they are parts of different polymer compounds (2) and (3), and thus the claim is not indefinite. Claims 4, 6, 8, 10, 12, 14, and 16, which depend from claim 2, are also thus not indefinite.

Accordingly, claims 2, 4, 6, 8, 10, 12, 14, and 16 are not indefinite. Reconsideration and withdrawal of the rejection are respectfully requested.

II. Rejection Under §103

Claims 1, 3, 5, 7, 9, 11, 13, and 15 are rejected under 35 U.S.C. §103(a) over Trefonas in view of Bringhen. Applicants respectfully traverse this rejection.

Independent claim 1 is directed to an anti-reflection film material used in lithography which contains at least a polymer compound having repeating units for copolymerization represented by the recited general formula (1). The anti-reflection film according to the claimed invention possesses an outstanding reflection preventive effect that halation and a standing wave can be fully suppressed at the time of exposure, especially in lithography where a short wavelength light is used. Moreover, because the acid diffusion to the photoresist film from the anti-reflection film can be prevented at the time of exposure, a resist pattern is made in a perpendicular configuration. Furthermore, etch selectivity is high, etch rate is higher than the photoresist film at the time of etching of the anti-reflection film, and an etch rate is slower than a substrate at the time of etching of the substrate. Accordingly, a fine pattern can be formed on a substrate with a high degree of accuracy by lithography. See specification at page 14, line 17 to page 15, line 3. Such an anti-reflection film material is nowhere taught or suggested by the cited references.

Trefonas describes organic anti-reflective coatings, and compositions used to make such coatings. Trefonas specifically discloses a group of organic anti-reflective coatings that are optimized for lithographic applications, where the organic anti-reflective coatings are formed from materials including polymers containing hydroxy-

alkyl methacrylate monomers for crosslinkable sites, styrene for a chromophore, and additional alkyl methacrylate monomers as property modifiers. Trefonas at Abstract.

The Office Action admits that Trefonas does not disclose that the polymer backbone is a siloxane backbone. However, the Office Action argues that Bringhen discloses such siloxane polymer backbones, and it would have been obvious to substitute the siloxane polymer backbones for the alkyl methacrylate polymers of Trefonas, to practice the claimed invention. Applicants disagree.

First, Applicants submit that Bringhen is non-analogous art, and is improperly combined with Trefonas. Bringhen nowhere teaches or suggests any compositions suitable for use as anti-reflective coatings in lithography. Instead, Bringhen is directed to cosmetic light-screening compositions. See, for example, Bringhen at claim 18. Rather than being used as an anti-reflective coating in lithography, the compositions of Bringhen are used for the protection of human skin and human hair against ultraviolet radiation. See col. 1, lines 18-23. While Trefonas discloses anti-reflective coatings for lithography using alkyl methacrylate polymers, Bringhen teaches a different composition (siloxane backbone polymers) for a different purpose (cosmetic light-screening).

It is well settled that prior art references must be "within the field of the inventor's endeavor ... [or] reasonably pertinent to the particular problem with which the inventor was involved." *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1572, 220 USPQ 584, 588 (Fed. Cir. 1984). In the present case, Bringhen is directed to cosmetic light-screening compositions that are only concerned with screening ultraviolet light to protect human skin and hair. Accordingly, the constituents of the cosmetic light-screening composition of Bringhen are added to enhance the light-screening effect. One of ordinary skill in the art of lithographic

processes using organic anti-reflective coatings would not have been motivated to look to the entirely different art of cosmetic light-screening compositions using siloxane polymers, and would not consider the cosmetic light-screening compositions as being applicable to lithographic processes. Thus, Bringhen is not within the same field of endeavor as Trefonas or the claimed invention.

Neither is Bringhen reasonably pertinent to the particular problem with which applicants were involved. The claimed invention is directed to anti-reflective coatings for lithography, whereas Bringhen is directed to cosmetic light-screening compositions that are meant to block ultraviolet light. Thus, Bringhen is non-analogous art improperly cited against the instant claims.

Second, even if Trefonas and Bringhen were properly considered together, there is no teaching or suggestion that the siloxane polymer materials of Bringhen could or should be substituted for the alkyl methacrylate (hydrocarbon) polymers of Trefonas. Although claim 18 of Bringhen recites the alternative use of hydrocarbon polymers and siloxane polymers, that disclosure is insufficient to have rendered obvious the claimed invention. In claim 18, Bringhen merely discloses that hydrocarbon polymers and siloxane polymers carrying at least one ultraviolet-light-absorbing group can alternatively be used as UV-B filter agent. That disclosure entirely fails to teach or suggest that either composition could advantageously be used for the entirely different purpose of anti-reflective coatings for use in lithography. Neither Trefonas nor Bringhen teaches that generic ultraviolet light absorbing groups can also be used as anti-reflective coatings for lithography, much less that the specific siloxane materials of Bringhen have this property.

Nowhere does Trefonas or Bringhen teach or suggest that the respective polymer backbone structures are interchangeable. Neither reference teaches or suggests that the backbone structures can be interchanged, or that the backbone structures would provide the same advantageous effect. The only teaching of the use of siloxane structures as anti-reflective coatings comes from the present specification, amounting to an improper use of hindsight to have rendered obvious the claimed invention.

Still further, even if Trefonas and Bringhen were properly combinable, which they are not, the references do not teach or suggest the unexpected results of the claimed invention. That is, neither Trefonas nor Bringhen teaches or suggests that substituting a siloxane backbone for the organic hydrocarbon backbones of Trefonas would provide an anti-reflective coating in which halation and a standing wave can be fully suppressed at the time of lithography exposure, and acid diffusion to the photoresist film from the anti-reflection film can be prevented at the time of exposure to provide a resist pattern made in a perpendicular configuration. Nor do the references teach or suggest that by such a substitution, etch selectivity is high, etch rate is higher than the photoresist film at the time of etching of the anti-reflection film, and an etch rate is slower than a substrate at the time of etching of the substrate, to provide a fine pattern formed on a substrate with a high degree of accuracy by lithography.

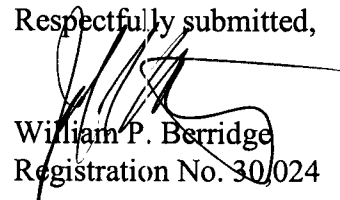
For at least these reasons, the claimed invention would not have been obvious over Trefonas in combination with Bringhen. Reconsideration and withdrawal of the rejection are respectfully requested.

III. Conclusion

In view of the above amendments and remarks, it is respectfully submitted that the above-identified patent application is in condition for allowance. Favorable consideration and prompt allowance are therefore respectfully requested.

Should the Examiner believe anything further would be necessary in order to place the application in condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,



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